

# Great Salt Lake Mercury Methylation: Deep Brine Layer vs Underlying Sediment

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# Great Salt Lake Mercury Methylation

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- Trace elements and DOC are equivalent among sites and years
  - Deep brine layer THg and MeHg concentrations are spatially invariable
  - Sediment THg and MeHg concentrations are spatially variable (highest south of Gilbert Bay)
  - Spiking samples with inorganic Hg nearly doubled MeHg content in sediment (greatest increase near south end), but yielded negligible change in deep brine layer in April
  - Spiking samples with inorganic Hg produced minimal changes in MeHg content in July (8% increase in sediment 2% decrease in DBL)
  - Normalizing to ambient MeHg concentrations indicates methylation occurring primarily in sediment
  - De-methylation is the dominant process in deep brine layer; methylation dominates in underlying sediments with greater changes in April than July for both phases
  - April methylation potentials are much greater in the sediment vs deep brine layer

# Great Salt Lake 2011-2012 Sampling Locations



C1

C2

2012 C1

A1

A2

B2

B1

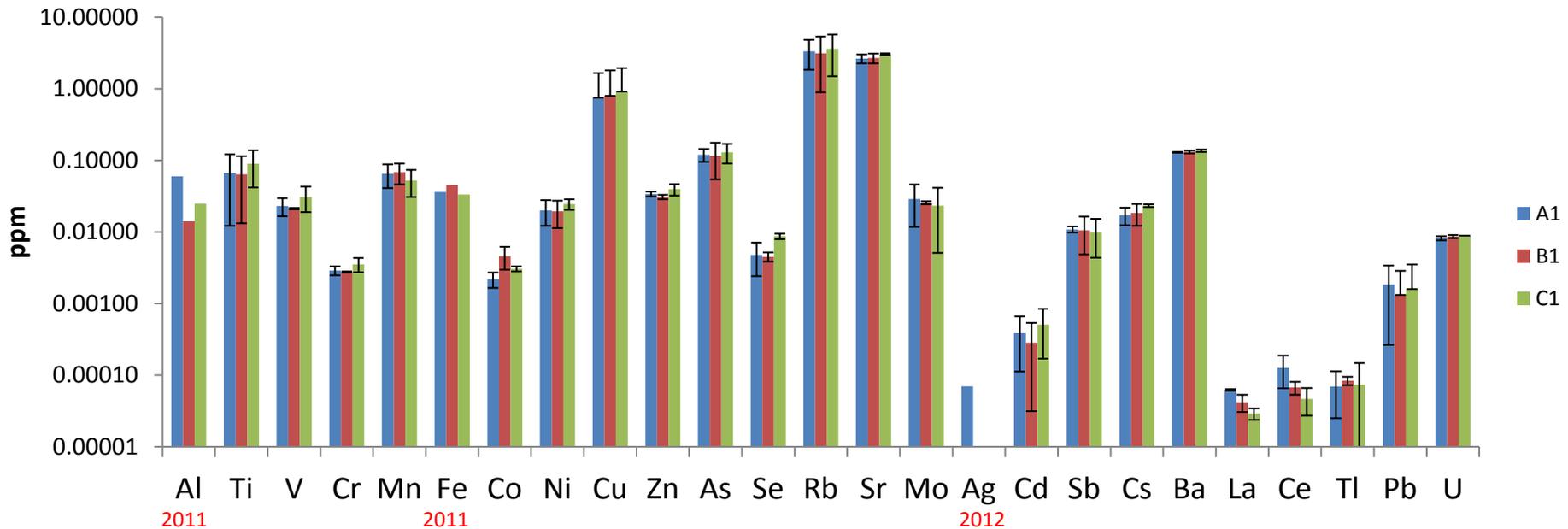
Image © 2012 TerraMetrics

Google earth

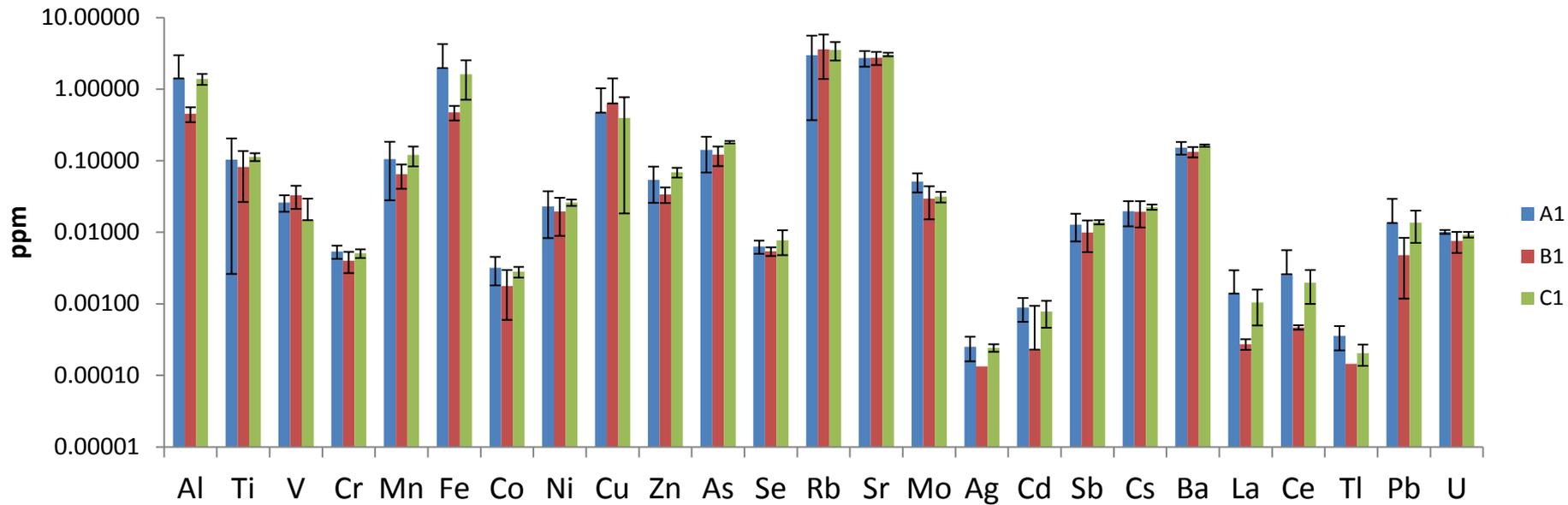
40°59'46.44" N 112°25'31.30" W elev 4204 ft

Eye alt 47.26 mi

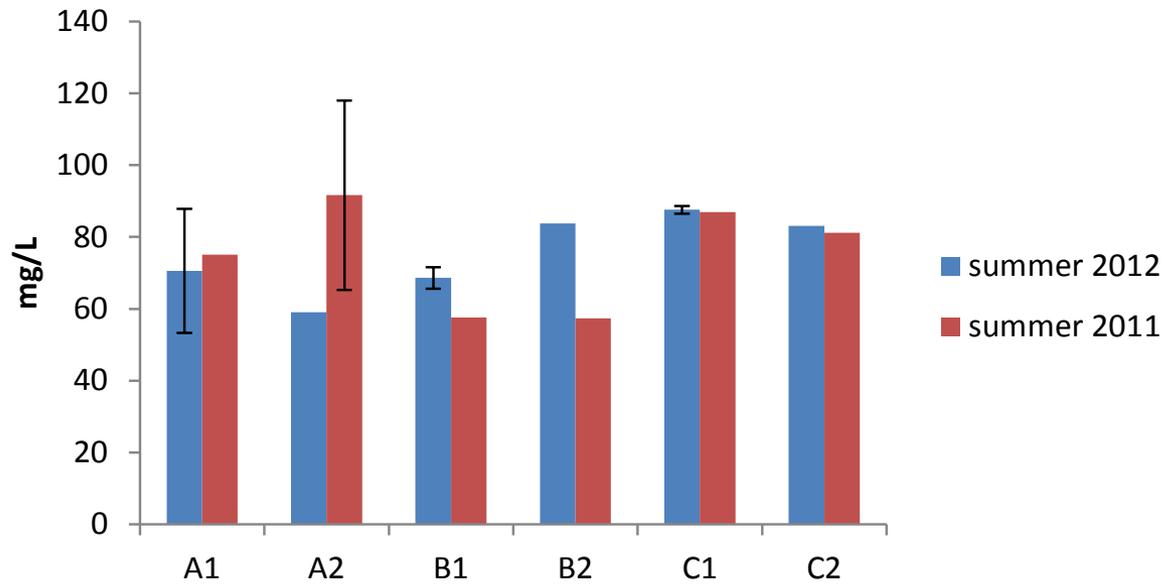
## Deep Brine Layer Summer 2011 and 2012 Filtered Trace Metals



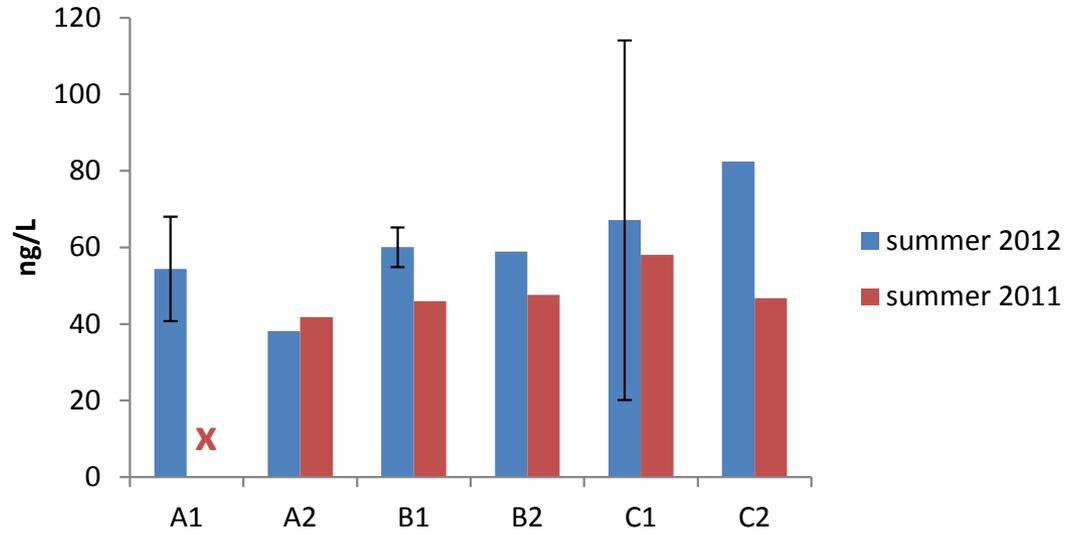
## Deep Brine Layer Summer 2011 and 2012 Unfiltered Trace Metals



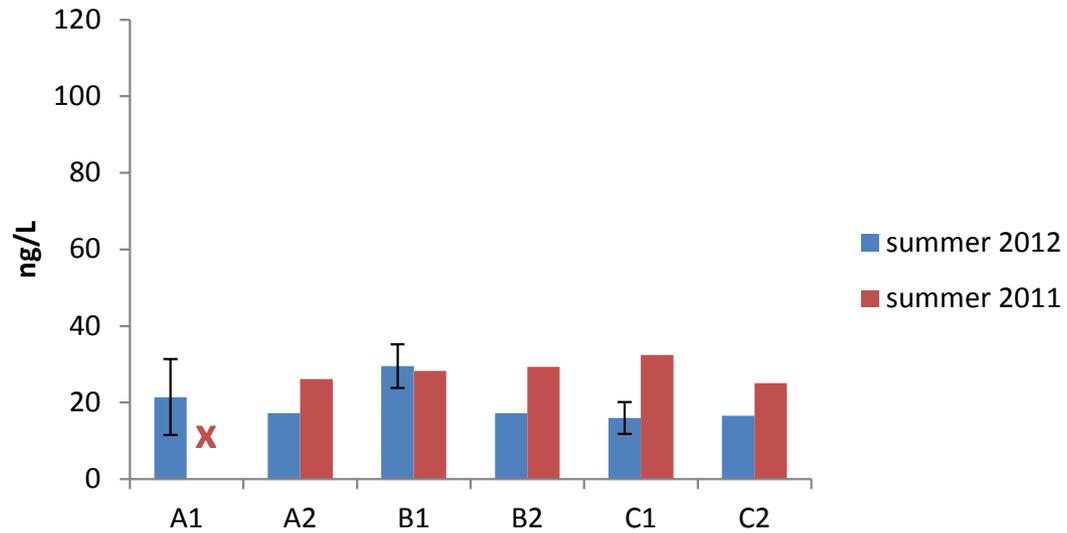
## Summer 2012 and 2011 DOC



## GSL DBL Unfiltered THg

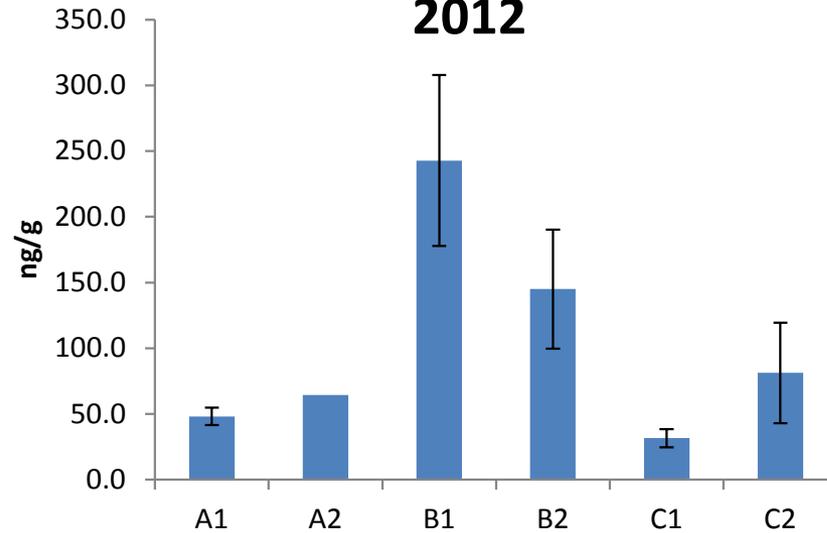


## GSL DBL Unfiltered MeHg



## GSL Sediment THg Summer

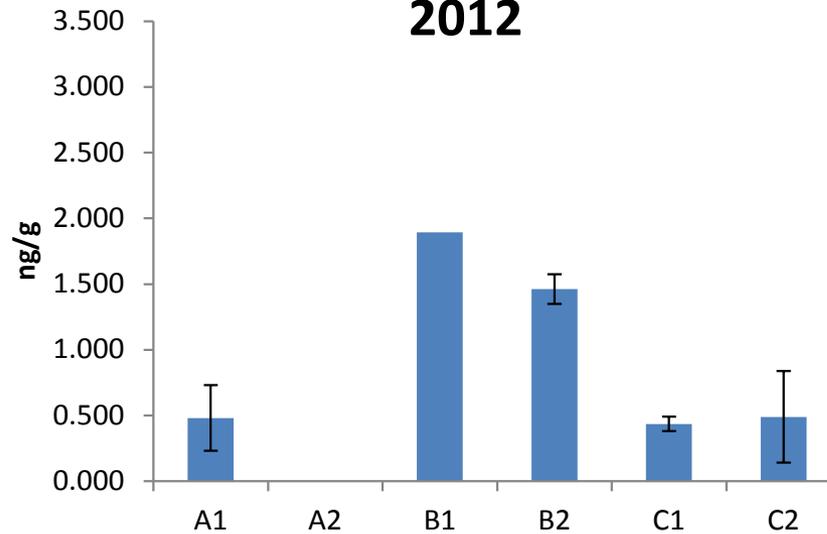
2012

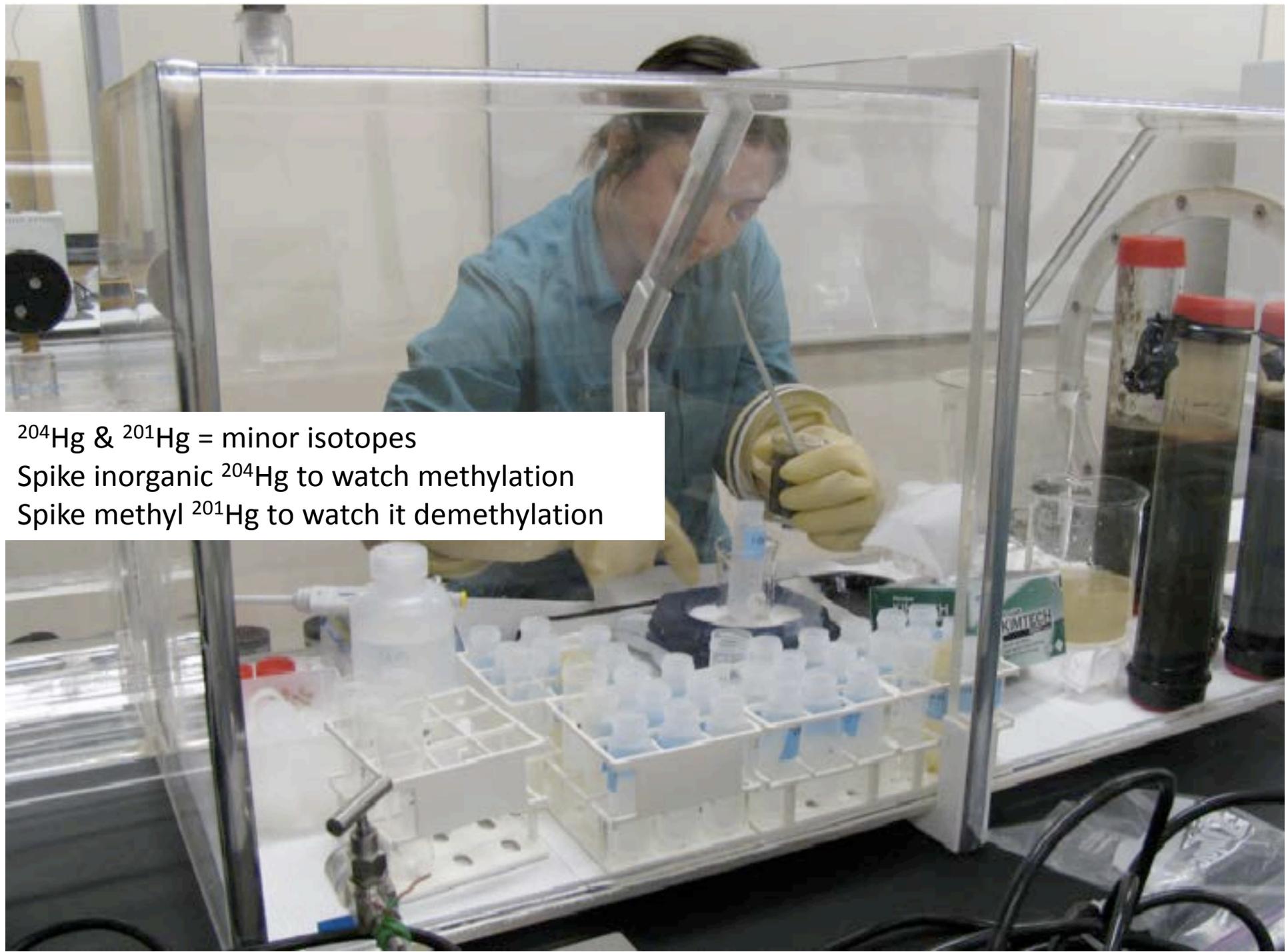


Average of April  
& July Data

## GSL Sediment MeHg Summer

2012

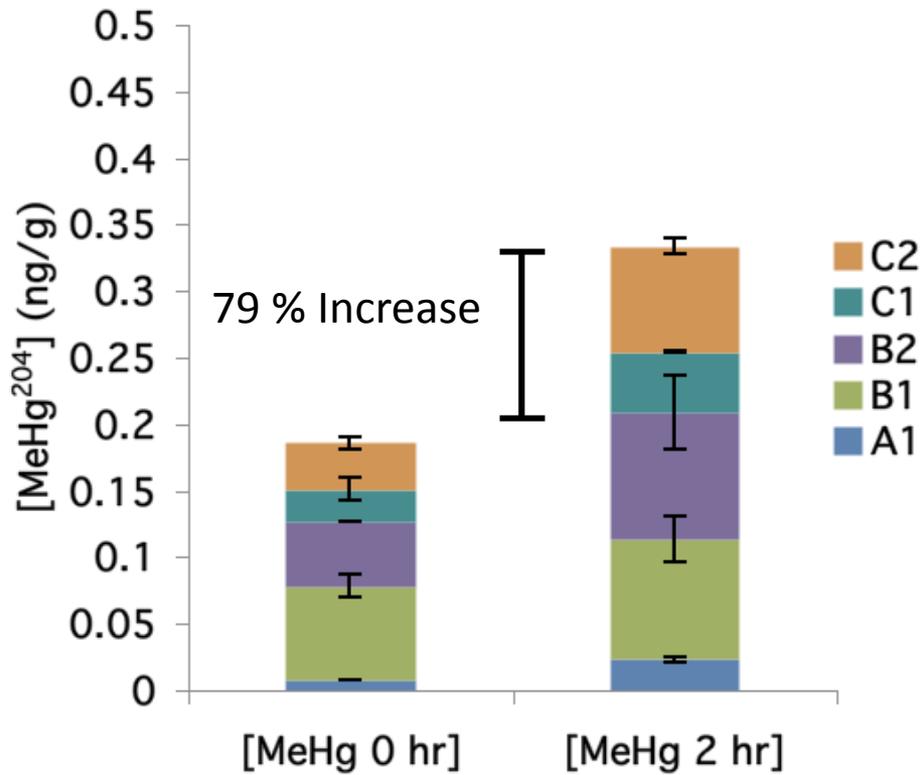




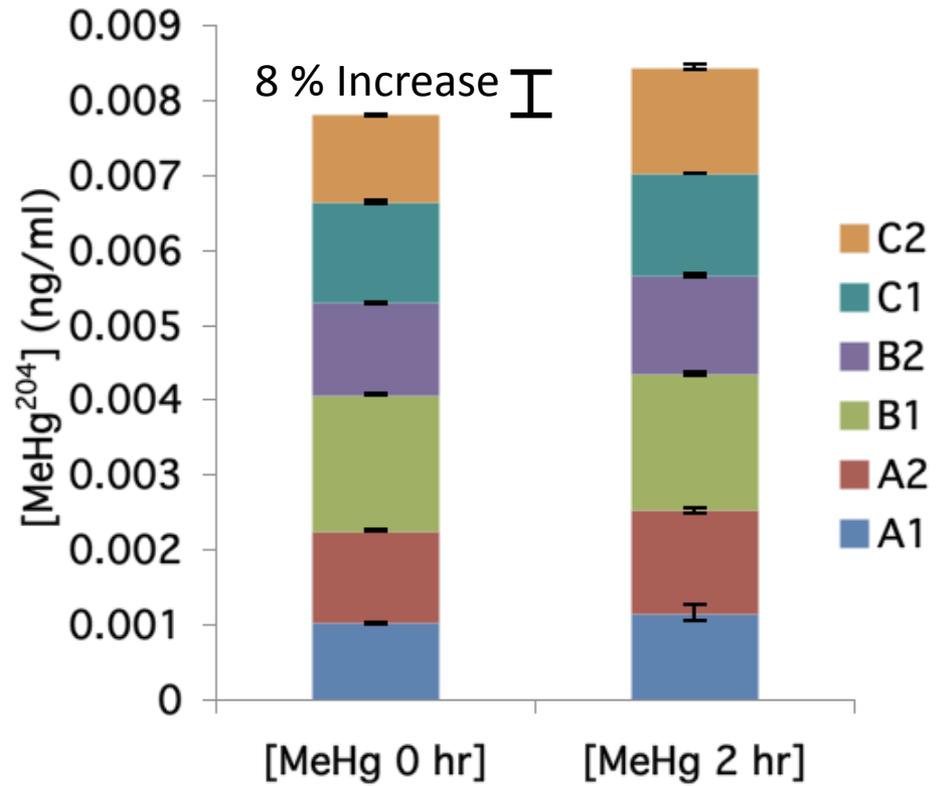
$^{204}\text{Hg}$  &  $^{201}\text{Hg}$  = minor isotopes  
Spike inorganic  $^{204}\text{Hg}$  to watch methylation  
Spike methyl  $^{201}\text{Hg}$  to watch it demethylation

# Sediment and Deep Brine Layer MeHg<sup>204</sup> Concentrations 0-2 Hours April 2012

April 2012 sediment  $\Delta$ MeHg<sup>204</sup> 0-2 hour

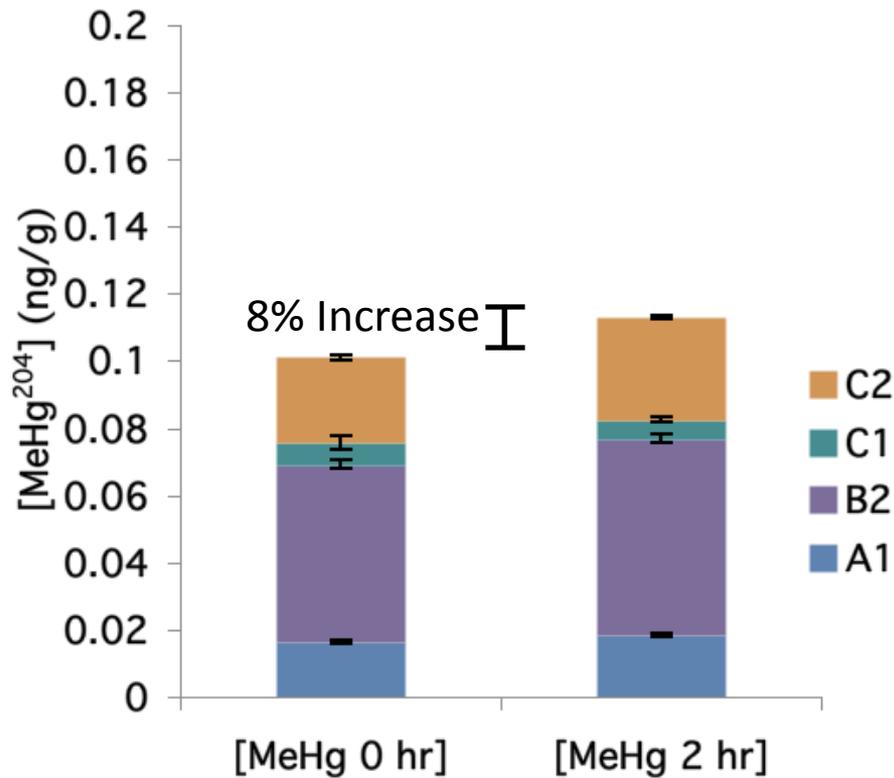


April 2012 DBL  $\Delta$ MeHg<sup>204</sup> 0-2 hour

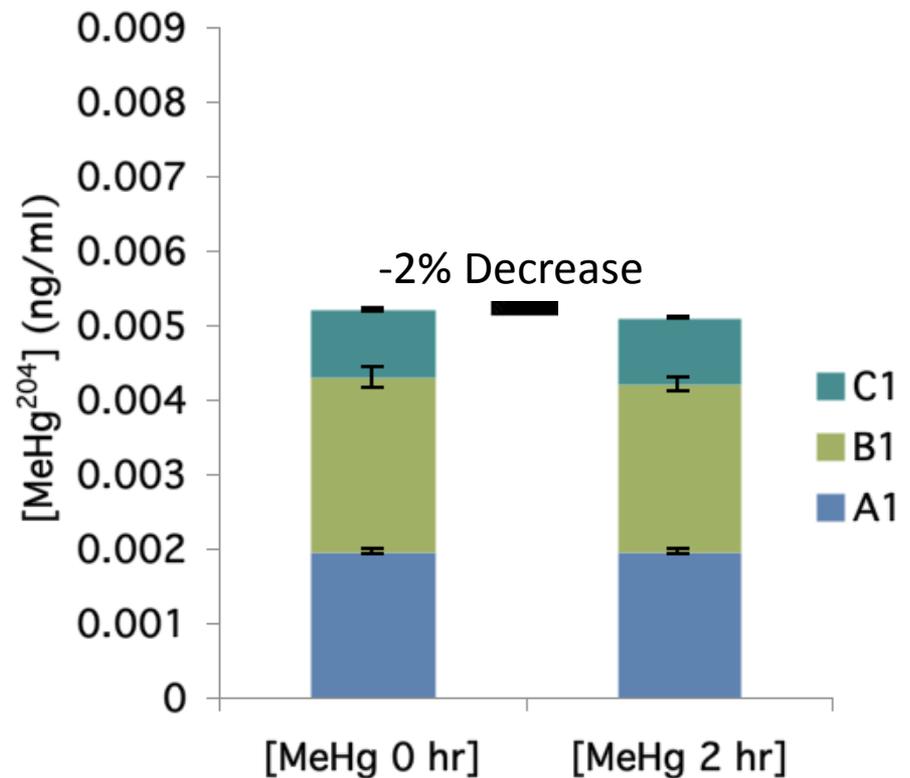


# Sediment and Deep Brine Layer MeHg<sup>204</sup> Concentrations 0-2 Hours July 2012

July 2012 sediment  $\Delta$ MeHg<sup>204</sup> 0-2 hour

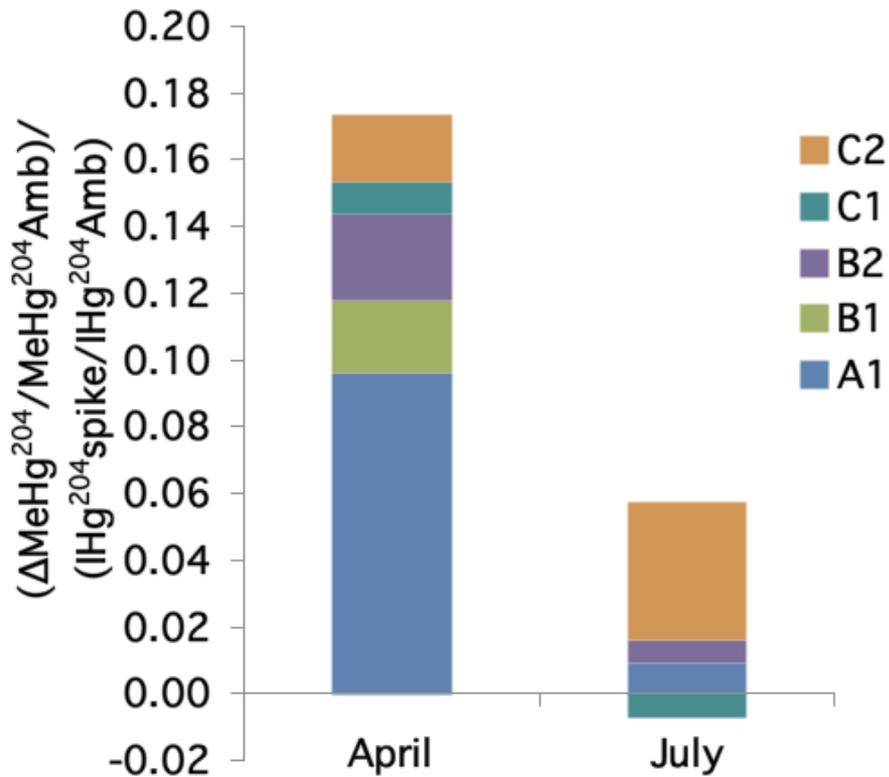


July 2012 DBL  $\Delta$ MeHg<sup>204</sup> 0-2 hour

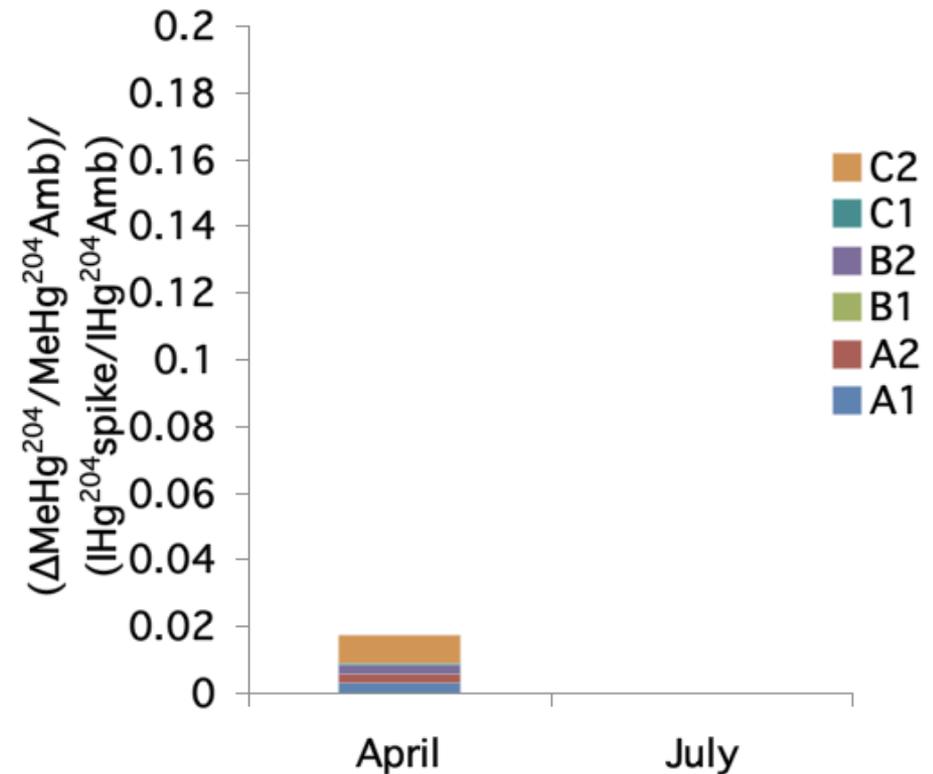


# GSL Sediment and Deep Brine Layer Normalized Change

2012 Sediment 0-2 Hour  
Normalized  $\Delta\text{MeHg}^{204}$

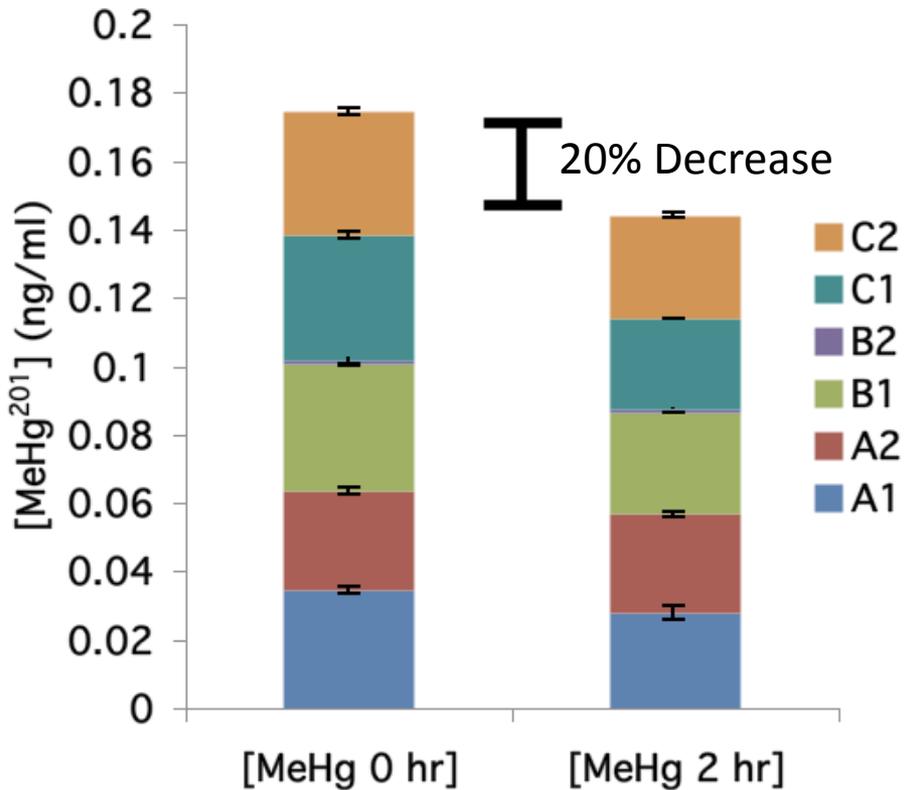


2012 Deep Brine Layer 0-2 Hour  
Normalized  $\Delta\text{MeHg}^{204}$

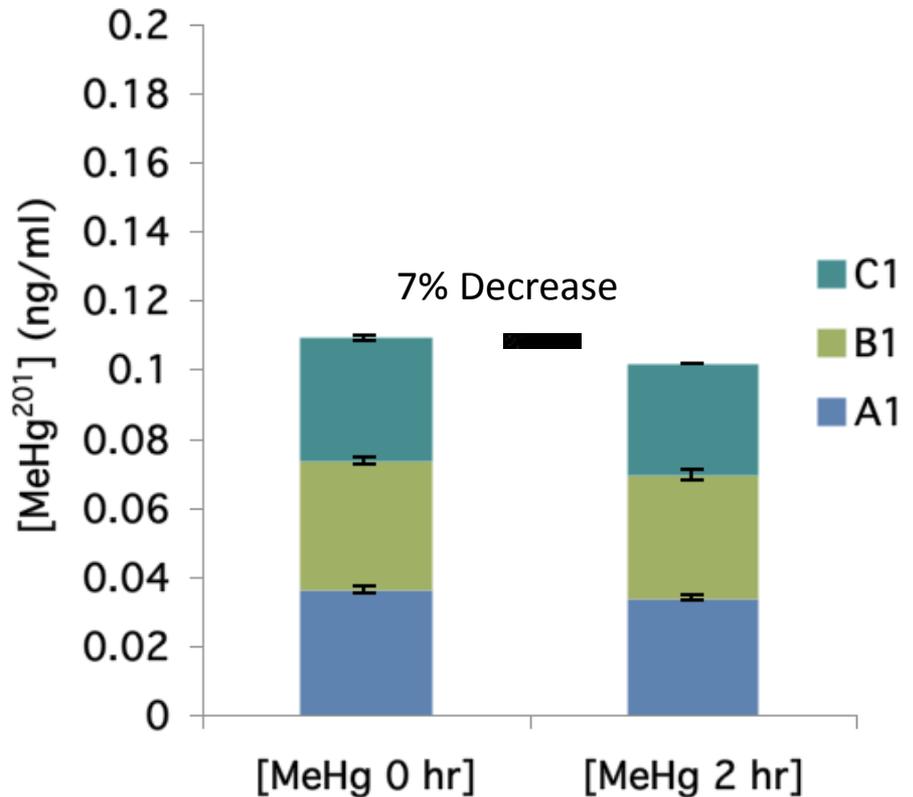


# Deep Brine Layer April and July 0-2 Hour MeHg<sup>201</sup> Concentrations

April 2012 DBL  $\Delta$ MeHg<sup>201</sup> 0-2 hour



July 2012 DBL  $\Delta$ MeHg<sup>201</sup> 0-2 hour

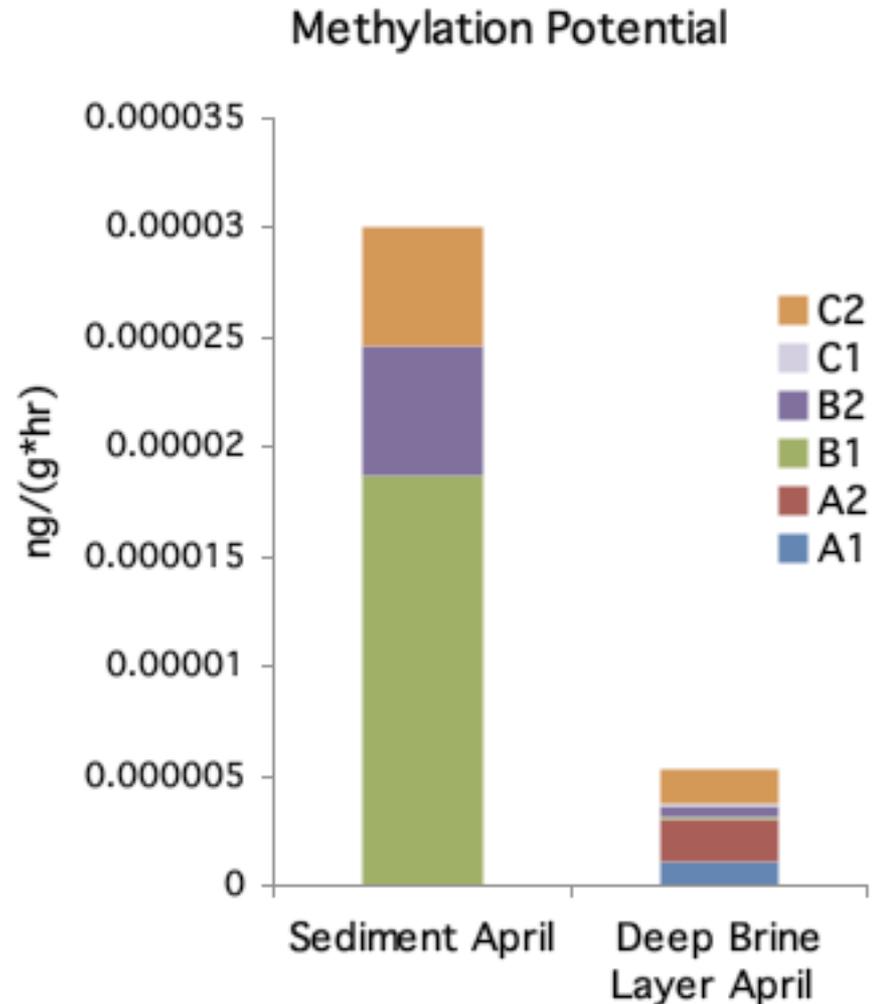


0-2 Hour sediment MeHg<sup>201</sup> for April and July was flat or slightly increased

# Methylation Potential of Sediments and Deep Brine Layer of The Great Salt Lake April 2012

Methylation Potential =  
 $k_{\text{meth}}[\text{Reactive Inorganic Mercury}]$

- $k_{\text{meth}}$  developed from modeling observed concentration changes of  $\text{MeHg}^{204}$  from 0-2 hours
- 3 of 5 April sediment samples have detectable RIHg values.
- Sediment July RIHg measurements are pending analysis.
- Deep brine layer July RIHg values were all under detection limit.
- Detection limit of RIHg for sediment is 1000 times higher than the deep brine layer



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